



INDRAPRASTHA INSTITUTE *of*  
INFORMATION TECHNOLOGY  
DELHI

**TENDER FOR PURCHASE OF LABORATORY TRAINERS**  
**FOR PERMANENT CAMPUS OF THE INSTITUTE AT**  
**OKHLA PHASE-III, NEW DELHI-110020**

(Tender no.IIITD/S&P/08/2013-14)

## **INVITATION FOR BIDS**

1. Indraprastha Institute of Information Technology (IIITD), Delhi a State University created by an Act of Govt. of NCT of Delhi invites sealed financial bids for purchase of laboratory trainers (as per specification mentioned under Scope of Work below) for its permanent campus at Okhla Phase-III New Delhi-110020 (behind Govind Puri Metro Station).
2. An amount of Rs.10,000/- (Rupees Ten Thousand only) towards earnest money (EMD) must be deposited in the form of demand draft in favor of IIIT-Delhi, payable at New Delhi. No interest shall be payable on the earnest money deposited by the bidder. Tender Document without earnest money will be summarily rejected.
3. Please enclose non-refundable Tender Document Fee of Rs.1000/- (One Thousand only) in the form of Demand draft drawn in favor of IIIT-Delhi payable at New Delhi.
4. The last date for submission of bids is 12<sup>th</sup> July 2013 up to 3:00 PM. The Tender Document should be addressed to:

Registrar,  
Indraprastha Institute of Information Technology, Delhi  
Okhla Phase-III  
(Behind Govind Puri Metro Station)  
New Delhi-110020.

5. The bids shall be opened on the same day i.e. 12<sup>th</sup> July, 2013 at 3:30 PM.

## **SCOPE OF WORK**

Supply of Trainers as per description, quantity and specifications below:

<b>S. No.</b>	<b>Item Name</b>	<b>Quantity</b>
1.	Basic Transmission Line Trainer	One
2.	Basic Microstrip Component Trainer	One
3.	Advanced Microstrip Trainer	One
4.	Doppler Radar Trainer	One
5.	Basic Antenna and Propagation Trainer	One
6.	Microwave Test Bench	One

**Specification of Item no. 1**  
**(Basic Transmission Line Trainer)**

- On board line, terminating resistances and test generators
- Functional blocks indicated on board mimic
- Built in Power Supply
- Transmission Line : Coaxial cable 100m (25 m x 4)
- Impedance matching : 0 - 100 Ohms. 2 nos. resistances
- Test Generators :
  - Sine Wave 40 KHz - 400 KHz (Low Range)
  - Square Wave 400 KHz - 4MHz (High Range)
- Interconnections : 2 mm Banana sockets
- Test Points : 10
- Optional: Digital LCR meter

**Specification of Item no. 2**  
**(Basic Microstrip Component Trainer) Microwave Integrated Circuit Trainer**

**Trainer should include:**

**1. . MIC Components Kit with Accessories , 2. Microwave Generator (2.2 - 3 GHz) , 3. Digital VSWR Meter**

**1. MIC Components & Accessories**

50 W Micro strip Line,Band Stop Filter,Parallel line Directional Coupler (15 dB),Wilkinson Power Divider (3 dB),Branch line Directional Coupler (3 dB)  
Low Pass Filter,Band Pass Filter, Ring Resonator,Rat-Race Hybrid Ring Coupler (3 dB ),MIC Antennas (2 Nos.),MIC Amplifier,Slotted section  
Matched Loads (5 Nos.) ,Short ,Coaxial detector, Micro strip Directional Coupler ( 10 dB ),SMA to SMA Adapters ( Both male & female),SMA (male) connector fitted cables ,Attenuator ( 3 dB )

**2. Microwave Generator**

Frequency Range : 2.2 - 3 GHz Continuously Variable , Display : 4 Digit LCD,Display Accuracy : 40 MHz  
Impedance : 50 Ohm  
Min RF level : 5 mW, O/P Level Variation : 10 - 20 dB  
Operating Modes : Sweep, CW, Int. AM, Int. FM, Ext. AM, PC communication  
Modulating Frequency : 100 Hz to 5 KHz AM Square Wave, FM ,Triangular Wave

**3. VSWR Meter**

Display : 16 x 2 Characters LCD  
Sensitivity : 0.1 mV for 200 ohms input impedance  
Range : 0 - 60 dB in 10 dB steps  
Input : Un-biased low and high impedance biased crystal (200 ohms and 200 K)  
Display Select : SWR 1 – 9 , dB 0 - 10  
Modes : Normal ,Audio PC-Interface

Gain Control : Adjusts the reference level, variable range 0 -10 dB(approx)  
Input Connector : BNC (F)

**Specification of Item no. 3**  
**(Advanced Microstrip Trainer)**

Same as above (items no. 2)

**Specification of Item no. 4**  
**Radar Trainer(Doppler Radar Trainer)**

**Features:**

- Complete hardware and software setup to demonstrate Radar concepts
- Signals study on Software / Oscilloscope with the help of test points given on trainer
- Object counter provided on trainer
- Real time fan RPM measurements and vibrations measurements with the help of tuning forks
- Tripod stand provided for height and level matching
- LED Indication for Doppler Echo Signal
- On board alarm for detected signals

**Technical Specification:**

Transmitter Frequency: 10 GHz,

Output Power: 10 to 15mW,

Operating Voltage: 8.6 V, Antenna : Horn, IF Output : Audio range

Power Supply: 230 V  $\pm$ 10%, 50 Hz,

Alarm: Onboard detected signal indication,

About Software:

Oscilloscope: Real time/Storage mode with FFT analysis

Display: Peak to Peak Voltage,

Time domain window: Display the Doppler Frequency in Time domain

Frequency domain window: Display the Doppler Frequency in Frequency domain.

Control Panel window:

User interface for: a) Measurement of Doppler Frequency & Amplitude

b) Measurement of Velocity, RPM

Utilities : Start / Stop of Display, Setting of Time base and Amplitude range on display window Printing of Doppler Frequency signal, Cursors for Time & Voltage measurements, Save, Load.

**Specification of Items no. 5**  
**Basic Antenna and Propagation Trainer**

**Features:**

- A Complete set for Transmission, Reception and Measurement of Microwave Power.
- Digital displays are provided for relative strength measurement of microwave.
- Complete set of accessories for performing the experiments of Reflection, Refraction, polarization Interference etc.
- Audio / Voice communication facility should be provided.

1 Provided with a detector probe for field detection.

**Specification:**

Frequency of Operation : 10 GHz (approx)

Power of Transmission : 10 -15 mW

Operating Voltage : 8 V (approx)

Antennas for Transmission & Reception : Horn type

Goniometer Scale : 0° - 360°

Tone Generator : 1 KHz Frequency

Transmitter and Receiver arm length : 50 cm each

Power Display : Digital, Relative Measurements

Accessories: Microwave transmitter, microwave receiver, Transmitter Arm, Receiver Arm, Goniometer

Main Unit, Detector Probe, Prism, Metal Plates of different dimensions, Partial Reflectors, Din Connectors

Cables, Metal Plate holder, Polarization Grille, Prism Stand, Microphone

**Specification of Items no. 6**

**1. KLYSTRON BASED X- Band MICROWAVE TEST BENCH**

Consists the following Components:

1. Solid state Klystron power supply
2. Klystron Mount
3. Klystron tube 2K25
4. Isolator
5. Frequency meter (direct read out, digital display)
6. Variable attenuator
7. Slotted section
8. Tunable probe
9. Detector mount
10. Movable short
11. Matched terminator
12. VSWR meter with LCD display
13. Wave guide stand
14. S.S. tuner
15. Cooling Fan

**Specification of Klystron Power Supply:**

- Input Voltage : 230V AC  $\pm$  10%, 50Hz
- Beam Supply : Beam Voltage 240 – 420VDC Variable ,Current: 50mA,
- Regulation : 0.5% for 10% I/P Variation, Ripple : <5mV RMS
- Repeller Supply : 10 – 270VDC Variable,Regulation : 0.25% for 10% I/P Variation
- Filament Supply : 6.3VDC
- Modulation : AM( Square Wave) , FM ( Saw- Tooth)
- Frequency Range: 500 –2500 Hz (AM), 150 –300 (FM)
- Amplitude : 0- 110V (AM), 0- 65V (FM)
- External Modulation: Through external Modulating Signal
- Display: 3½ digit Digital Display For a) Beam Voltage b) Beam Current c) Repeller Voltage

- Connector: a. Din Sockets, b. BNC for External Modulation
- Voice Communication: Using microphone.

### **Specification of VSWR Meter:**

- Display: 16x2 Character microcontroller based with BAR Graph LCD Display  
For SWR, Power & mode selection
- Sensitivity: 0.1 $\mu$ V for 200 $\Omega$  impedance
- Noise Level : Less than 0.02 mV
- Range : 0 - 60 dB in 10 dB steps
- Input : Un-biased low and high impedance biased crystal (200  $\Omega$  and 200 K $\Omega$ )
- Display Select : SWR 1 – 9, dB 0 - 10
- Modes : Normal, Audio, PC-Interface
- Gain Control : Adjusts the reference level, variable range 0 -10 dB (approx)
- Input Connector : BNC (F)

Standard Accessories with Complete Bench: Wall Chart, Live demonstration Contents, Silver Polish, Cooling Fan, BNC Cables, Sufficient Screws with fly nut type, Mains card, BNC to BNC Cable, Microphone for voice, communication, e-Manual, interactive e – manual and interactive teaching & simulation software.

## **2. GUNN OSCILLATOR BASED X-Band MICROWAVE TEST BENCH**

Consists the following Component:

1. Gunn Oscillator
2. PIN Modulator
3. Solid State Gunn Power supply
4. Isolator
5. Frequency meter (Direct Readout)
6. Variable Attenuator
7. Slotted Section
8. Tunable Probe
9. Detector Mount
10. Movable Short
11. Matched Termination
12. VSWR Meter with LCD display
13. Wave Guide Stand
14. S.S. Tuner
15. Fixed Short
16. Cooling Fan

### **Specification of Gunn Power Supply:**

- Display: 16x2 Character Microcontroller based LCD Display for voltage & current simultaneously and for function selection(Square wave, PC Interface, Audio Modulation)
- Voltage Range :0 To 10V
- Current : 0 To 750mA

- Regulation : 0.2% for +/- 10% Variation
- Ripple : 2mV(rms)
- Modulation Frequency: 800 –1200 Hz, Square Wave
- Modulation Amplitude: 0 – 10V (peak to Peak )
- Output Connector : BNC(F) For Gunn Bias , UHF (F) for PIN Mod.
- Modulation: Continuous Wave, Internal Modulation (Square Wave), Data communication & image communication on PC, Audio Modulation
- PC Communication : Through RS232 cable
- Voice communication: Using Microphone

**Specification of VSWR Meter:**

- Display: 16x2 Character microcontroller based with BAR Graph LCD Display  
For SWR, Power & mode selection
- Sensitivity: 0.1 $\mu$ V for 200 $\Omega$  impedance
- Noise Level : Less than 0.02 mV
- Range : 0 - 60 dB in 10 dB steps
- Input : Un-biased low and high impedance biased crystal (200  $\Omega$  and 200 K $\Omega$ )
- Display Select : SWR 1 – 9, dB 0 - 10
- Modes : Normal, Audio,PC-Interface
- Gain Control : Adjusts the reference level, variable range 0 -10 dB (approx)
- Input Connector : BNC (F)

Standard Accessories with Complete Bench: Wall Chart, Live demonstration Contents, Silver Polish, Cooling Fan, BNC Cables, Sufficient Screws with fly nut type, Mains card, BNC to BNC Cable, Microphone for voice, communication, e-Manual, interactive e – manual and interactive teaching & simulation software.

## TERMS AND CONDITIONS

1. The financial bid should be valid for a period of not less than 30 days from the date of opening of bid.
2. The items are to be supplied within a period of 2 weeks from the date of issue of Purchase Order (PO) by the Institute.
3. The bidder should be (OEM) Authorized Dealer. Certificate to this effect from (OEM) needs to be attached along with the bid.
4. Bids will be opened in the presence of bidder's representatives, who choose to attend on the specified date and time. Only one representative shall be allowed to attend.
5. Sealed bid can be sent either by post or by messenger. The responsibility of delivery of bid lies entirely with the bidder.
6. Payment will rereleased after successful commissioning as certified by Professor in Charge of the Institute.
7. In the event of dispute, Director, IIT-Delhi shall be the sole arbitrator and his decision shall be final and binding on both the parties.
8. IIT-Delhi does not bind itself to accept the lowest or any other offer and reserves the right to accept or reject any or all the offers either in full or in part without assigning any reason.
9. In case the reseller is not able to execute the Order, EMD amount of Rs.10,000/- (Rupees Ten Thousand only) shall be forfeited.



**PROFORMA FOR FINANCIAL BID**

<b>S. No.</b>	<b>Item Name</b>	<b>Qty.</b>	<b>Base Cost (Rs.)</b>	<b>Taxes (Rs.)</b>	<b>Total Cost (Rs.)</b>
1.	Basic Transmission Line Trainer				
2.	Basic Microstrip Component Trainer				
3.	Advanced Microstrip Trainer				
4.	Doppler Radar Trainer				
5.	Basic Antenna and Propagation Trainer				
6.	Microwave Test Bench				

Total Cost (all inclusive) of quantity mentioned above (in words):

We accept that the rate quoted above shall remain valid for a period of 30 days from the date mentioned below. The product/part shall be supplied within a period of two weeks from the date of placing Purchase Order on us.

(Signature and seal of the Bidder)

Date: